BEFORE THE

Federal Communications Commission

WASHINGTON, D.C.

In the Matter of	)	
	)	
Annual Assessment of the Status	)	CS Docket No. 95-61
Competition in the Market for the	)	
Delivery of Video Programming	)	

REPLY COMMENTS OF TELE-COMMUNICATIONS, INC.

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Tele-Communications, Inc. ("TCI") hereby submits its Reply Comments on the Notice of Inquiry ("Notice") in the above-captioned proceeding.[1]

I. INTRODUCTION AND SUMMARY

In the Notice, the Commission raises issues relating to ownership structure and competition in the multichannel video programming distribution ("MVPD") marketplace. The record in this proceeding, as well as the generally available public record, are replete with data and analyses on these issues. All of these data and analyses clearly demonstrate the following:

- **Horizontal Concentration.** Common ownership of cable systems leads to significant efficiencies in the acquisition and marketing of program services, the development of new technologies and services, and the

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[1] Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, Notice of Inquiry in Docket No. 95-61 (released May 24, 1995).

deployment of an advanced nationwide infrastructure.[2] National cable ownership substantially in excess of the current level would not pose a threat of monopoly power over the programming market.[3]

- **Vertical Integration.** Efficiencies in development, distribution, marketing, and purchasing of programming that result from vertical integration are critical to continued quality and innovation in the program market.[4] There is no systematic evidence to suggest that non-vertically-integrated programmers lack sufficient access to cable systems, or that the Commission's channel occupancy limits, or indeed any limits, are necessary to ensure such access.[5] In addition, data provided in NCTA's Comments show that the level of vertical integration has remained stable over the last year while the level of non-affiliated

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[2] See Stanley M. Besen, Steven R. Brenner, John R. Woodbury, "An Economic Analysis of the FCC's Proposed Cable Ownership Restrictions," February 9, 1993, submitted as an attachment to TCI's Comments in CS Docket No. 94-48, June 29, 1994 ("Besen, et al."). The Commission recognized these advantages in the Notice at ¶ 77 ("Large MSOs may be able to operate efficiently in a variety of areas, including administration, distribution and procurement of programming"). See also NCTA Comments at 26-32; Time Warner Comments at 4-5.

[3] See Besen, et al. at 2 ("neither the current level of horizontal concentration in cable ownership, nor an increase in that concentration, poses a substantial threat of increased market power and reduced program diversity"). See also Areeda and Hovenkamp, Antitrust Law 548-549 (1992 Supp.) ("there is substantial merit in a presumption that market shares below 50 or 60 percent do not constitute monopoly power"). The jurisprudence in monopsony cases reaches similar conclusions. See, e.g., United States v. Syufy Enterprises, 903 F.2d 659, 663-71 (9th Cir. 1990) (single firm market shares variously calculated at 39%-75% deemed insufficient to confer monopsony power).

[4] See Besen, et al. at 23. Moreover, the advantages of vertical integration cannot be reasonably duplicated through contract or other means. See O.E. Williamson, Markets and Hierarchies: Analysis and Antitrust Implications, New York: Free Press, 1975 (explaining the advantages of vertical integration over other methods of streamlining distribution costs).

[5] This is particularly true in light of the fact that the program access, leased access, and must carry requirements address the same issues as vertical integration limits.

programming options has experienced a significant increase.[6]

- **Clustering.** The scale and scope economies achievable through cable system clustering allow cable operators to realize lower costs, more efficient regional advertising, and higher quality services.[7] Moreover, clustering is necessary if the cable industry is to successfully compete in local telephony.[8] For these and other reasons, all transactions involving clustering of cable systems that have been reviewed by the Commission and the federal antitrust agencies have been approved. Indeed, NTIA has voiced the strong opinion of the Administration that clustering is essential to the future of telecommunications and should not be discouraged.[9]

- **Alternative MVPDs.** The number of alternative MVPDs is significant and growing rapidly. These alternatives offer programming that is comparable to cable, at comparable prices.[10] DBS growth has been particularly

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[6] NCTA Comments at 32-33.

[7] The Commission has noted that "regional concentration may result in significant efficiencies," and "may also reflect the desire of cable operators to position themselves to compete against LECs that are poised to enter the market for the distribution of multichannel video programming." Notice at ¶ 82 (quoting Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, First Report, CS Docket No. 94-48, 9 F.C.C.R. 7442, 7518-19 (1994)). See also Time Warner Comments at 3-19 for a thorough analysis of the benefits of clustering and its negligible anticompetitive effects.

[8] Congress has recognized that "[C]able is the most logical competitor to telephone companies for residential services." S. Rep. No. 104-123, 104th Cong., 1st Sess. 53 (1995). See also Time Warner Comments at 8-12.

[9] See Letter from Larry Irving to the Honorable Janet D. Steiger, Chairman of the Federal Trade Commission, January 12, 1995. This letter is attached to these Reply Comments.

[10] See, e.g., Comments of NCTA at 6 (DirecTv is now offering a package that makes both equipment and service available for under $30 per month); Comments of Home Box Office at 12 (citing EchoStar's plans to offer competitive MVPD service from $9.95 to $19.95).

impressive.[11] Similarly, telephone companies, whether through video dialtone, MMDS, or other technologies, are moving quickly to enter the video distribution business.[12] MMDS, or "wireless cable," also provides competition in a low-cost and accessible manner.[13] It is inescapable that the competitive landscape today is fundamentally different from that which existed when Congress passed the 1992 Cable Act.

The foregoing issues have been analyzed and debated exhaustively in comments already before the Commission, and TCI on several occasions has provided the Commission with its views and analysis. TCI will not repeat that analysis here. Instead, TCI focuses in these Reply Comments on the future of the cable television business. In particular, TCI addresses the industry's ability to increase the capacity and upgrade the functionality of its systems and discusses two potential barriers to such expansion: 1) the complex issues surrounding the conversion from

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[11] Consumers purchased over one million DBS dishes in their first year of availability with an expected 1.5 million subscribers by the end of 1995, an estimated two-thirds of which are present or former cable subscribers. DirecTv Comments at 5-6. By comparison, only 30,000 VCRs and only 35,000 compact disc players were sold in their first years. See "Small Dish Mania," Video Magazine, April 1995, at 46. See also "VHS Stalwarts Get 'Realistic' About Digital Superhighway," Video Business, March 31, 1995, at 38 (VCRs took four years to achieve same penetration as DBS currently has). The Atlanta Journal and Constitution (November 6, 1994, at D1) reported that DirecTv and USSB are adding over 2000 new subscribers per day. DirecTv alone expects to garner 10 million subscribers by the year 2000. DirecTv Comments at 5.

[12] See NCTA Comments at 11-14.

[13] See Comments of The Wireless Cable Association, Inc. at 2-3 (documenting estimates that the number of wireless cable providers has nearly quadrupled since 1993, while the number of total subscribers has more than doubled). According to cited statistics from Paul Kagan, wireless cable will have nearly 1.4 million subscribers by year end and nearly 3.3 million by the year 2000. Id.

analog to digital television, most notably technical standard setting; and 2) the need for clear capital recovery rules that permit cable operators to aggressively upgrade their plants with fiber and other technologies that will increase the capacity, reliability, and quality of the systems.

- **The Transition To Digital Technology**

While TCI recognizes that there may be times when government standard setting is appropriate, now is not such a time. To some extent, government standards always limit technological innovation. However, in highly dynamic markets, the potential to forestall innovation is greater because the level of innovative activity is greater. Today, the MVPD marketplace is undergoing a level of technological innovation and experimentation not seen since the industrial revolution. This dynamism is increasingly important to our nation's economy and ultimately will improve consumer welfare by increasing the quality and diversity of entertainment and information services. The Commission should have a strong presumption against any action that curtails such technological growth.

However, if the Commission decides that it must set a digital broadcast SDTV standard, it should: 1) ensure that the standard conforms to the MPEG-2, "Main Level, Simple Profile" specification, and that it accommodates the SDTV system components already developed and implemented by the cable industry and other MVPDs; and 2) impose the standard only on broadcasting, particularly if the Commission adopts a standard

that optimizes digital broadcast transmission, but limits the ability of other MVPDs to maximize their digital transmissions.

- **The Need for Capital Recovery Rules That Allow Cable Operators to Substantially Upgrade Their Systems**

The Commission has recognized that benchmark regulations do not allow cable operators to recover the costs of significant system upgrades. It adopted a streamlined cost-of-service procedure to address this deficiency and instructed the Cable Services Bureau to develop the necessary cost-recovery form.[14] TCI strongly endorses this approach and is encouraged by recent reports that the Commission is moving expeditiously to issue the cost-recovery form. Below, TCI offers specific recommendations on the elements that should be included in the form. Most importantly, the Commission should provide regulatory certainty which, in turn, will enhance cable operators' ability to secure capital for infrastructure investment.[15]

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[14] See Cost-of-Service Order, 9 F.C.C.R. 4527, ¶¶ 285-291 (1994).

[15] Recently, a number of financial institutions described the negative effect of regulatory uncertainty on the willingness of lenders to make investments in the cable industry. See In the Matter of The Social Contract for Continental Cablevision, Comments of The Bank of New York, The First National Bank of Boston, and The Toronto Dominion Bank, FCC 95-137, p. 2 (submitted May 22, 1995) ("[I]n light of the industry's regulatory environment ... it is difficult for us to be supportive of the industry's efforts to build advanced telecommunications platforms").

II. THE TRANSITION TO DIGITAL TECHNOLOGY

In this section, TCI discusses the issue of digital standards, which will be a critical factor in determining how rapidly and efficiently the transition to digital television occurs. TCI also responds to the Commission's request for information regarding the status of TCI's National Digital Television Center.

A. Digital Standards

1. The Government Should Avoid Setting Technical Standards in Dynamic Industries

The Notice asks whether the Commission should adopt standards for any or all transmission media.[16] TCI concurs with the universal opinion of the commenters that digital standards should be set by the marketplace, or industry standards-setting bodies, and not by the Commission or any other government entity.[17] This is especially true when technology is undergoing rapid change and the potential stifling effect of premature government standards is great. Government standards setting in such an environment is particularly complex and risky because mistakes tend to be non-linear -- small errors in judgment today can have disastrously large consequences tomorrow. Drs. Stanley

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[16] Notice at ¶ 71(f).

[17] See Bell Atlantic Comments at n. 10; General Instrument Corporation Comments at 11-16; HBO Comments at 26; NCTA Comments at 20-23.

M. Besen and Leland L. Johnson, two recognized scholars on the issue of technical standards setting, have concluded:

> [T]he government should refrain from attempting to mandate or evaluate standards when the technologies themselves are subject to rapid change. ... It is only after the technologies have "settled down" that government action is most likely to be fruitful, as illustrated in the TV stereo case.[18]

The MVPD marketplace is currently undergoing the most dynamic period of technological innovation and experimentation in its history. For example, various cable operators, including TCI, have made substantial investments in digital technology and are currently experimenting with diverse network topologies for delivering interactive digital TV.[19] DBS has already launched its digital video systems and has sold over one million digital satellite receivers to consumers. Telcos continue to explore whether Asymmetric Digital Subscriber Line, hybrid fiber coax, or switched digital video will be their digital video platform of choice. MMDS operators will soon implement digital compression in their systems. Each of these players has invested significantly in research and development efforts, and many have undertaken costly market trials to test consumer demand for the

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[18] Stanley M. Besen and Leland L. Johnson, "Compatibility Standards, Competition, and Innovation in the Broadcasting Industry," Rand Corporation, November 1986, at 135 ("Rand Compatibility Study"). See also General Instrument Corporation Comments at 11-16.

[19] See "Tech Debate Blurs Digital Agenda," Multichannel News, June 12, 1995, at 1A. See also the discussion of TCI's National Digital Television Center in section II.B., infra.

coming generation of innovative digital services.[20] The Commission should not thwart this valuable activity by prematurely imposing digital video standards on MVPD technologies.

The histories of the personal computer ("PC") and personal communications services ("PCS") industries are particularly illuminating in this regard. The government's reliance on a market-driven standards process in the PC industry has resulted in increased consumer choices, reduced equipment prices, unprecedented innovation, and retention of America's leadership position in this global industry. Similarly, the Commission recognized the rapid technological change inherent in PCS development, and therefore wisely established a flexible regulatory approach to the establishment of PCS technical standards:

> [M]ost parties recognize that PCS is at a nascent stage in its development and that imposition of a rigid technical framework at this time may stifle the introduction of important new technology. We agree, and find that the flexible approach toward PCS standards that we are adopting is the most appropriate approach.[21]

This decision has resulted in vigorous innovation and competition among vying PCS transmission schemes.[22]

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[20] See "Go Digital," Cablevision, May 22, 1995, at 39-50; See also "Server Vendors Eye Compatibility Issues" and "Ventura To Test Two-Way TV," Interactive Age, April 10, 1995, at 42.

[21] PCS Second Report and Order, 8 F.C.C.R. 7700, at ¶ 137 (1993).

[22] See "CDMA Wins Major Backer in Bells' PCS Primeco," Multichannel News, June 12, 1995, at 1A.

By contrast, premature adoption of a government standard in the MVPD marketplace would not only frustrate the realization of the benefits achieved in the PC and PCS industries, it also could result in an unfortunate replay of the standards-setting fiasco that occurred in the government's selection of a color TV standard in 1950. As Besen and Johnson describe this experience:

> [The color TV experience] suggests that dangers of premature standard setting are especially great if significant refinements are taking place at the same time that the relative merits of the various alternative technologies are being considered. The FCC was probably aware of this danger of premature action, but it was under pressure to make a decision: If selection of an incompatible system was inevitable, the sooner the decision was made the smaller would be the installed base of incompatible black and white receivers. The outcome was, nonetheless, a mistake.[23]

The Commission should be guided by past experience which uniformly recommends against government standards setting in markets, such as the MVPD market, where technology is undergoing rapid change.

2. If the Commission Adopts an SDTV Standard for Broadcasting, It Should: (1) Ensure that the Standard is Compatible with MPEG-2, "Main Level, Simple Profile;" and (2) Accommodate the SDTV System Components Already Implemented by the Cable Industry and Other MVPDs

It has been reported that the Commission will soon consider adopting a standard for "Standard Definition Television" ("SDTV") for digital broadcasting.[24] This effort appears to be an

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[23] Rand Compatibility Study at 94.

[24] See e.g., Speech of Reed E. Hundt, delivered to the National Cable Television Association Convention, Dallas Texas, May 9, 1995, at 3 ("By the time I come to this convention

(continued...)

outgrowth of the Commission's HDTV standards-setting process. The HDTV process began in 1987 and only recently was expanded to encompass the possibility of a government standard for SDTV.[25] The particular SDTV standard the Commission appears to be focusing on is the one that is currently being worked on by the "Digital HDTV Grand Alliance." This detour into the SDTV realm raises significant concerns for TCI and the cable industry.

For the reasons cited in the previous section, TCI believes it is premature to adopt SDTV standards. TCI is particularly concerned that the Commission not use the HDTV process as a springboard for the adoption of a digital broadcast standard that effectively becomes an SDTV standard for all video distributors. Allowing the HDTV "tail" to wag the SDTV "dog" could have enormous consequences for all other distribution media, including cable.[26]

If the Commission nonetheless decides to adopt an SDTV standard for broadcasters, TCI urges the Commission to conform

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[24](...continued)
breakfast next year, I predict the FCC will have authorized a new standard for sending digital broadcast signals over the air").

[25] The interest in an SDTV standard for digital broadcasting is related to the issue of allowing broadcasters to use channels originally set aside for HDTV as conduits for multiple NTSC video and/or data services. See "Hundt Throws Wrench into Digital TV Future," Multichannel News, May 15, 1995, at 1 ("The standards are necessary, Hundt said, because Congress is likely to mandate giving broadcasters the option to use second channels for delivery of multiple digital channels rather than high-definition television").

[26] See NCTA Comments at 20-23.

this standard to the parameters set forth in the following two sections.

a. Any Broadcast SDTV Standard Should Conform to the MPEG-2, "Main Level, Simple Profile" Specification

The Commission should ensure that any digital broadcast SDTV standard it adopts conforms to the MPEG-2, "Main Level, Simple Profile" ("MPEG-2 MLSP") specification for video coding and transport. The MPEG-2 MLSP specification is an international standard, established by the International Telecommunications Union ("ITU") and described by the ITU in ISO/IEC 13818-1 (transport stream) and ISO/IEC 13818-2, Section 8 (video coding).

The MPEG-2 MLSP specification excludes bi-directionally predicted frames, or "B frames," in the picture sequence.[27] TCI strongly urges the Commission to avoid inclusion of B-frame motion coding into a broadcast SDTV standard. B-frame motion coding requires the use of additional memory chips that will add an extra $50 to $60 to the cable operator's costs for each digital cable set-top terminal. The cost of digital boxes even without the additional memory for B frames is substantially higher than the cost for existing analog boxes. Given the Commission's genuine concern that the higher cost of digital

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[27] There are three types of frames used in MPEG-2 video encoding: I, P, and B frames. I frames are compressed with reference only to the data within that frame, whereas P and B frames use interframe compression. P frames, also known as "predicted frames," are compressed more than I frames and are based on either the previous P or I frame, whichever is closest in the video data stream. B frames are created from both the previous and next I or P frames.

boxes will delay the deployment of the NII,[28] B frames should not be required as part of the broadcast SDTV standard.

Beyond the cost savings, there are three additional reasons to exclude B-frame technology as a required SDTV parameter. First, the resolution enhancements that are cited by some as justification for the additional expense associated with B-frame motion coding are imperceptible to the typical consumer. Only an engineer with a trained eye for spotting digital video artifacts would notice any difference between B-frame-enhanced and non-B-frame-enhanced compression.

Second, technological alternatives are available which are capable of achieving resolution comparable to that produced with B frames without incurring the additional $50 to $60 per digital set-top to implement B-frame technology. For example, for sports and other live video, the digital box could employ DigiCipher® II motion coding enhancements at full resolution without B frames (and at a much lower cost). Alternatively, an MPEG-2 resolution improvement tool, called "dual prime," could be used at the encoder end, also without B frames. Other increasingly clever encoding techniques and the use of higher bit rates where motion challenges are greatest will also produce picture improvements, without the high costs associated with B-frame implementation.

Third, if the Commission were to require B-frame motion coding as part of the digital broadcast SDTV standard, it would,

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[28] See Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, FCC 95-186, CS Docket No. 95-61 (released May 24, 1995), at ¶ 67.

in effect, create substantial incompatibility with the millions of digital boxes that will already have been purchased and deployed by cable operators and other MVPDs by the time the broadcast SDTV standard is formally implemented. TCI has already purchased over one million digital boxes, implementing MPEG-2 MLSP, for delivery beginning later this year. Other cable operators and alternative MVPDs have made similarly substantial investments in MPEG-2 MLSP silicon. The Commission can avoid these incompatibilities, as well as considerable and unnecessary consumer expense by conforming any digital broadcast SDTV standard it adopts to the MPEG-2 MLSP specification.

b. Any Broadcast SDTV Standard Should Accommodate the SDTV System Components Already Implemented by the Cable Industry and Other MVPDs

TCI also is concerned that any digital broadcast SDTV standard adopted by the Commission will go beyond the video decoding and transport areas that are at the heart of MPEG-2. The MPEG-2 standard leaves much in the system component area undefined. Examples include treatment of the vertical blanking interval and closed captioning information, as well as the "system information" ("SI") description.[29] Each of these

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[29] The SI description incorporates the necessary information to enable not only broadcast television, audio, and data services, but also the necessary extensions to support the implementation of interactive services. The SI description includes the message that defines network data, as well as program-related information such as program names and program ratings, and clarifications and extensions to the MPEG Program Specific Information ("PSI"). A sampling of the message formats provided include the Service Association Message, the Conditional (continued...)

undefined system components represents another area of potential incompatibility with non-broadcast technologies if an SDTV standard that is adopted for broadcasters defines system components differently than the SDTV systems that are already in production mode by other MVPDs. The cable industry and CableLabs has spent the last seven years analyzing, testing, defining, and implementing the system components required for an SDTV standard. This activity provides a much more appropriate basis for implementing SDTV than the ATSC process which until recently was focused on the much-narrower issue of HDTV. The system components identified by CableLabs are already embedded in TCI equipment and/or silicon, as well as in the SDTV facilities of other MVPDs. Rather than reinvent the wheel and risk creating incompatibilities with these distributors, the Commission should accommodate these system components in any SDTV standard it adopts for digital broadcasting.

* * *

Now is an appropriate time to require the Grand Alliance to make any changes necessary to ensure that its SDTV standard for digital broadcasting conforms to MPEG-2 MLSP, because the Grand Alliance SDTV standard has not been fully formulated. In fact, although the ATSC recently voted to approve the picture format

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[29](...continued)
Access Message, the Service Map Message, the Program Information Message, the Program Name Message, the Virtual Channel Message, the System Time Message, the Network Text Message, and the Network Information Message. In addition, the SI description describes the format of the multilingual character strings used in the system.

component of the Grand Alliance SDTV standard, it did so only by a slim 13-11 margin, hardly a consensus. Moreover, the Grand Alliance standard never has been analyzed and tested to determine whether it will work with the system parameters of cable or any other MVPD system. Thus, the potential for marketplace disruption is significant. Moreover, requiring the Grand Alliance standard to conform to MPEG-2 MLSP and existing system components would not involve abandoning the Commission's previous work. It would simply be another instance of the Commission recognizing the evolutionary nature of standards setting. For example, while the Commission initially received analog HDTV proposals, it subsequently recognized the advantages of digital and requested system proponents to resubmit all-digital proposals. Similarly, the Commission should now recognize the advantages of accommodating pre-existing SDTV specifications that have already been implemented by the cable industry and others.

TCI looks forward to continuing its work with the Grand Alliance and with the Commission to explain in greater depth the characteristics of our embedded digital plant and the nature of our specific concerns about SDTV standards setting by the Commission. Obviously, more detailed discussions among engineers should follow, and TCI is willing to assist the Commission in any way it can in order to maximize compatibility and minimize consumer disruptions in the implementation of SDTV.

3. If the Commission Adopts a Digital Broadcast SDTV Standard, It Should Not Impose The Standard, Either Directly or Indirectly, on Other Video Distribution Technologies

As noted, TCI believes the Commission should not adopt a digital broadcast standard at this time. However, if the Commission decides to adopt a digital broadcast SDTV standard, it should not impose that standard, either directly or indirectly, on other video distribution technologies. This is particularly important if the Commission ignores the recommendations set forth in the previous section and adopts a standard that optimizes digital broadcast transmissions, but limits the ability of MVPDs to maximize their own use of digital technology.

MVPDs already have begun the process of implementing diverse and innovative approaches to the delivery of digital video. They have done so in an effort to advance the implementation of digital and the benefits the technology brings to consumers. TCI alone has invested or committed over a billion dollars to facilitate the early transition to digital technology. Millions of digital boxes have been ordered, and business plans are being finalized and implemented. Digital transmissions already are occurring and will continue to be initiated over these non-broadcast technologies before a single television set is capable of receiving over-the-air digital transmissions. In such an evolving landscape, even the suggestion that the Commission will impose a digital broadcast SDTV standard on other MVPDs could delay the significant progress being made in the digital realm, because MVPDs will face the real possibility that the investments

they make today will be rendered worthless by the retroactive application of a future government standard. The Commission should not discourage MVPDs from continuing to test various digital approaches. If allowed to flourish, such testing will produce the best approach to digital television and the greatest benefit for consumers, just as the creativity that was allowed to flourish in the PC and PCS industries has resulted in substantial innovation and consumer benefits.

Even if the Commission were considering the imposition of the digital broadcast SDTV standard on MVPDs, it could not do so with respect to the digital modulation scheme without seriously threatening the efficiency of each unique transmission medium. Each distribution technology uses different modulation (also called "transmission") schemes in order to optimize the particular characteristics of its medium. For example, DBS uses QSPK modulation, while the cable industry uses QAM modulation. The Grand Alliance has apparently selected VSB modulation. This diversity of modulation methods is a function of the physics of each transmission medium and could not and should not be standardized across these media.

Not only should the Commission refrain from directly imposing a digital broadcast standard on MVPDs; it should avoid imposing such a standard indirectly, as well. This could happen if the Commission limits direct application of a digital SDTV standard to broadcasting but forces the costs of backward compatibility to be borne by any technology that is inconsistent

with the broadcast standard. Such an approach would tend to force other technologies to use the broadcast standard, even though it might be inferior for their subscribers, particularly if the costs of backward compatibility are high. In the end, this could have the same chilling effect on technological innovation as mandating the standard for all technologies.

B. Description of TCI's National Digital Television Center

In ¶ 25 of the Notice, the Commission inquires about the status of TCI's National Digital Television Center ("NDTC"). The NDTC began operation in early 1994 in Denver, Colorado, and represents an investment of more than $100 million by TCI in digital compression technology. The NDTC is a 200,000 square foot facility which offers a full range of television production, post production, multimedia composition, master control room operations, digital compression, encryption, uplinking, and authorization services. These services are available to all MVPDs. The NDTC is only one of many operations providing various types of transmission and related services.

The NDTC has storage capacity for more than 400,000 hours of video programming. It is designed to accommodate the uplink of at least 500 television signals through its companion uplink facility, located 15 miles southwest of NDTC, and linked via fiber optic cable and/or microwave. NDTC has more than 2 million feet of video, audio, and data cable and utilizes state-of-the-art technology, such as real-time video compression, fully integrated encryption and authorization, multi-channel automated

program origination, computer-based quality control, disk-based digital production, robotic tape handling, and network traffic and scheduling systems. The NDTC is capable of transmitting programming to every satellite in the domestic arc, as well as many international satellites.

Currently, the NDTC uplinks approximately 75 channels of digitally compressed video to the Primestar satellite for delivery to approximately 500,000 Ku-band dish owners. In the future, NDTC will convert and digitally compress as many as ten analog cable program signals into the bandwidth currently required for the transmission of one analog signal. Once compressed, the digital signal will be uplinked to a satellite, which will retransmit the signal down to cable headends. The digitally compressed signal will then be modulated over a separate carrier at the headend and sent via fiber and coaxial cable plant to set-top boxes in a customer's home, where it will be decompressed and converted back to an analog signal that is viewable as up to ten channels of programming.[30]

"Headend In The Sky" ("HITS") is the label applied to NDTC's delivery of compressed signals and the authorization of those signals at the cable set-top level in order to promote efficient and economical digital deployment. The systems necessary to operate HITS service are currently undergoing beta testing with deployment targeted for early 1996. TCI will use HITS to expand

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[30] The NDTC also can be used to provide set-top and/or headend authorization for MMDS, SMATV, telcos, or any other redistribution entity.

subscriber offerings on its own cable systems and also will make HITS capacity available to non-TCI cable systems, on a commercial basis.

Any non-TCI systems wishing to utilize the NDTC will be required to negotiate independent agreements with programmers regarding the price, terms, and conditions of carriage of such programming. Once the agreements are reached, the NDTC's digital compression system enables cable systems and other MVPDs to offer increased channel capacity and dramatically expand program offerings to their customers. This is particularly significant in rural areas where the economics of system upgrades are daunting. NDTC is a technology solution. It enables rural America to share in the benefits of the information superhighway on an equal basis with consumers in more densely populated urban areas. Thus, it is not surprising that more than 100 predominantly small and rural cable operators have indicated their intention to use HITS to expand the number and array of services offered to millions of subscribers.

III. TCI SUPPORTS THE COMMISSION'S DECISION TO ESTABLISH CAPITAL RECOVERY RULES THAT ALLOW CABLE OPERATORS TO SUBSTANTIALLY UPGRADE THEIR SYSTEMS

Encouraging rapid and widespread private investment in cable system upgrades is a well-established governmental policy: the current Administration has firmly committed itself to this

goal,[31] and in the 1992 Cable Act Congress also established a clear policy in favor of encouraging the expansion of cable system capacity where economically justified.[32] However, cable operators subject to the current benchmark/cost-of-service regulatory regime can only upgrade on a gradual, piecemeal basis. If the goal of encouraging cable operators to build a truly national information infrastructure in the very near future is to be fulfilled, the Commission must establish regulations that make possible timely investment in upgrades on a national scale.

Cable companies can provide a critical contribution to the development of the NII, given appropriate regulatory measures. The Commission already has begun to produce such measures, such as the unregulated "New Product Tier" and the negotiation of a social contract. Some of these measures have begun to bear fruit; cable systems in numerous locations are undergoing

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[31] See e.g., Statement of Vice President Gore at the Federal-State-Local Telecommunications Summit (January 9, 1995) (describing the "paramount importance of private investment to build the NII"); Prepared Remarks by Vice President Gore at the National Press Club (December 21, 1993) ("If we do not move decisively to ensure that America has the information infrastructure we need, every business and consumer in America will suffer").

[32] See 1992 Cable Act § 2(b)(1), (2), Pub. L. No. 102-385, § 2(b)(1), (2), 106 Stat. 1460, 1463 (1992) (purpose of the 1992 Cable Act is to "ensure that cable operators continue to expand, where economically justified, their capacity and the programs offered over their cable systems" and to "promote the availability to the public of a diversity of views and information through cable television"). See also 47 U.S.C. § 521(4) (purpose of Title VI is to "assure that cable communications provide and are encouraged to provide the widest possible diversity of information sources and services to the public").

upgrades to improve service and add new services. While the current rate regulatory environment has thus not completely stifled innovation, more can be done to encourage the fulfillment of the national NII policy. Rate regulation has exacted a substantial toll upon cable operators, raising their costs of capital, creating new costs of compliance, and, most troublesome, producing uncertainty regarding future investment.[33] Thus, the appropriate question to ask is not whether the cable industry's economic performance under rate regulation today is "adequate," but how much more efficient or dynamic it would be under more forward-looking regulation.

The benefits of a digital NII have been well publicized. It will allow dramatic improvements in productivity -- virtually all economic activity in the U.S. is critically dependent upon an efficient telecommunications infrastructure. Other important policies also can be furthered by advances in telecommunications: schools, libraries, doctors' offices, and hospitals will all be able to perform their critical functions more rapidly and at lower cost. Also, bringing the potential of the NII to the home will create more opportunities in telecommuting, education, and medicine, as well as generally promoting a more effective dissemination of diverse ideas.

Furthermore, technical advancements in cable plant and architecture will permit a dramatic increase in effective system

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[33] See n. 15, supra for the investment community's view of Commission rate regulations.